IS 4389 (1987): Method for determination of colour fastness of textile materials to hot water [TXD 5: Chemical Methods of Test]

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Indian Standard

METHOD FOR DETERMINATION OF COLOUR FASTNESS OF TEXTILE MATERIALS TO HOT WATER

(First Revision)

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BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

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METHOD FOR DETERMINATION OF COLOUR FASTNESS OF TEXTILE MATERIALS TO HOT WATER

(First Revision)

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METHOD FOR DETERMINATION OF COLOUR FASTNESS OF TEXTILE MATERIALS TO HOT WATER

(First Revision)

0. FOREWORD

0.1 This Indian Standard (First Revision) was adopted by the Bureau of Indian Standards on 20 July 1987, after the draft finalized by the Chemical Methods of Test Sectional Committee had been approved by the Textile Division Council.

0.2 This Indian Standard was first published in 1967 and has now been revised to bring it in line with ISO-E-08-1978 Textiles — Tests for colour fastness : E08 Colour fastness to water : Hot water, issued by the International Organization for Standardization (ISO). In addition, sampling has been modified and brought in line with latest Indian Standards on colour fastness tests.

0.3 In reporting the results of a test or analysis made in accordance with this standard, if the final value, observed or calculated, expressing the result of a test, is to be rounded off, it shall be done in accordance with IS : 2-1960*.

1. SCOPE

1.1 This standard prescribes a method for determination of colour fastness of textile materials of all kinds and in all forms to the action of hot water.

1.1.1 The method prescribed in this standard is mainly applicable to wool and textiles containing wool.

2. PRINCIPLE

2.1 A specimen of textile in contact with adjacent fabrics is rolled around a glass rod, treated with slightly acidified hot water and dried. The change in colour of the specimen and the staining of the adjacent fabrics are assessed with the grey scales.

*Rules for rounding off numerical values (*revised*).

3. SAMPLING

3.1 Sample shall be so drawn as to be representative of the lot. Sample drawn in accordance with the procedure laid down in the material specification or as agreed to between the buyer and the seller shall be taken to be representative of the lot.

4. APPARATUS

4.1 Vessel — equipped with reflux condenser to hold a cylindrical specimen 4 cm long, in hot water.

4.2 Thermostatically Controlled Bath — to maintain the contents of the vessel (**4.1**) at 70° ± 2°C.

4.3 Glass Rod — 5 to 8 mm in diameter.

4.4 Wool Adjacent Fabric — 10 × 4 cm (*see* Appendix A).

4.5 Cotton Adjacent Fabric — or adjacent fabric made from the fibre used in a mixture with the wool, measuring 10 × 4 cm (*see* Appendix A).

4.6 Grey scales for assessing change in colour and staining (*see* IS : 768-1982* and IS : 769-1982†, respectively).

5. REAGENTS

5.0 Quality of Reagents — Unless specified otherwise, pure chemicals shall be employed in tests and distilled water (*see* IS: 1070-1977‡) shall be used where the use of water as reagent is intended.

NOTE — 'Pure chemicals' shall mean chemicals that do not contain impurities which affect the test results.

5.1 Distilled Water — If necessary, acidified with acetic acid to *p*H 6 ± 0·5.

6. PREPARATION OF COMPOSITE SPECIMENS

6.1 If the textile to be tested is fabric, draw a 10 × 4 cm test specimen from each piece in the test sample. Prepare a composite specimen by placing the test specimen between two adjacent fabrics (*see* **4.4** and **4.5**) and sew along one of the shorter sides. Prepare at least three such composite specimens.

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*Method for evaluating change in colour (*first revision*).

†Method for evaluating staining (*first revision*).

‡Specification for water for general laboratory use (*second revision*).

6.2 If the textile to be tested is yarn, knit or weave the test sample into fabric and draw from it a 10 × 4 cm test specimen; alternatively prepare a 10 × 4 cm test specimen in the form of parallel lengths of yarn, the amount of yarn taken being approximately equal to half the combined mass of the two adjacent fabrics (*see* **4.4** and **4.5**). Place the test specimen between two adjacent fabrics and sew around all four sides to hold the yarn in place and to form a composite specimen. Prepare at least three such composite specimens.

6.3 If the textile to be tested is loose fibre, comb and compress an amount approximately equal to half the combined mass of the adjacent fabrics (*see* **4.4** and **4.5**) into a sheet of 10 × 4 cm size. Place the sheet between two adjacent fabrics and sew around all four sides to hold the fibres in place and to form a composite specimen. Prepare at least three such composite specimens.

7. PROCEDURE

7.1 Roll the composite specimen around the glass rod to form a cylinder 4 cm long, and tie it loosely and uniformly with thread.

7.2 Treat the specimen on the rod for 30 minutes in slightly acidified distilled water (*see* **5.1**) at a temperature of 70° ± 2°C, at a liquor to material ratio of 30 : 1, under reflux. During the test, ensure that the composite specimen is always submerged in the water.

7.3 Remove the composite specimen from the rod and squeeze it. Open out the composite specimen by breaking the stitching on all sides except one of the shorter sides and dry it in air at a temperature not exceeding 60°C with three parts in contact only along the remaining line of stitching.

7.4 Evaluate the change in the colour of the treated test specimen by the method prescribed in IS : 768-1982*, and the degree of staining of the adjacent fabrics by the method prescribed in IS : 769-1982†.

NOTE 1 — Treated test specimen and the two adjacent fabrics should be allowed to cool after drying and to regain their normal moisture content before evaluation.

NOTE 2 — In cases of doubt in the colour fastness rating as assessed by an observer, the assessment should be done by at least three observers and the overall average rating should be reported.

7.5 Repeat the test with the remaining composite specimens.

8. REPORT

8.1 Report individually the numerical rating for change in colour of the test specimen, and the numerical ratings for staining of the two adjacent fabrics used in the preparation of the composite specimen.

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*Method for evaluating change in colour (*first revision*).

†Method of evaluating staining (*first revision*).

APPENDIX A

(*Clauses* 4.4 *and* 4.5)

CONSTRUCTIONAL DETAILS OF ADJACENT FABRICS

Sl No.	Adjacent Fabric	Mass in g/m²	Type of Weave	Ends/cm	Picks/cm	Tex of Yarn	
						Warp	Weft
i)	Cotton	115 ± 5	1/1 Plain	35	31	16·5	14
ii)	Viscose	140 ± 5	1/1 Plain	28	22	20	33
iii)	Wool	125 + 5 − 0	1/1 Plain	21 ± 0·5	18 ± 0·5	15·6 × 2 Worsted	15·6 × 2 Worsted
iv)	Polyamide	130 ± 5	1/1 Plain	17·5	20	10 × 2	20
v)	Polyester	130 ± 5	1/1 Plain	23·5	20·5	7·5 × 2	20
vi)	Acrylic	135 ± 5	1/1 Plain	17·5	16	10 × 2	10 × 2

Note 1 — For wool adjacent fabric, additional requirements are:

a) *p*H value of aqueous extract = 6·5 to 7·5,

b) Residual fat content = 0·4 ± 0 1 percent, and

c) Alkali solubility – less than 18 percent.

Note 2 — For polyamide and acrylic, additional requirements are:

a) *p*H value of aqueous extract = 7 ± 0·5, and

b) Residual oil content less than 1·0 percent.

Note 3 — For polyester, additional requirement is residual oil content less than 0·5 percent.

Note 4 — The adjacent fabrics shall be bleached and free from any sizing or finishing material and optical brightening agents.

Note 5 — The constructional and other details of adjacent fabrics as given above are for guidance only.

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INTERNATIONAL SYSTEM OF UNITS (SI UNITS)

Base Units

Quantity	*Unit*	*Symbol*
Length	metre	m
Mass	kilogram	kg
Time	second	s
Electric current	ampere	A
Thermodynamic temperature	kelvin	K
Luminous intensity	candela	ed
Amount of substance	mole	mol

Supplementary Units

Quantity	*Unit*	*Symbol*
Plane angle	radian	rad
Solid angle	steradian	sr

Derived Units

Quantity	*Unit*	*Symbol*	*Definition*
Force	newton	N	1 N = 1 kg.m/s^2
Energy	joule	J	1 J = 1 N.m
Power	watt	W	1 W = 1 J/s
Flux	weber	Wb	1 Wb = 1 V.s
Flux density	tesla	T	1 T = 1 Wb/m^2
Frequency	hertz	Hz	1 Hz = 1 c/s(s^{-1})
Electric conductance	siemens	S	1 S = 1 A/V
Electromotive force	volt	V	1 V = 1 W/A
Pressure, stress	pascal	Pa	1 Pa = 1 N/m^2

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